

**SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
NPDES PERMIT RENEWAL**

**TESTIMONY/COMMENTS OF ROBERT WILLIAMS
HDR ENGINEERING, INC.**

ON

**ESTIMATED SCHEDULES FOR PLANNING, DESIGNING, AND BUILDING
SIX DIFFERENT WASTEWATER TREATMENT SCENARIOS FOR THE
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT**

**On behalf of the
SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT**

I am Robert Williams. I am a registered professional engineer in the State of California (Registration No. 37558). I am a Senior Vice President at HDR Engineering, Inc. (HDR), and have been employed there for more than 33 years. I received a Bachelor of Science degree from the University of Cape Town in 1966 and a Master of Science degree from Colorado State University in 1977. My work experience has focused on wastewater treatment planning and design and has included: master planning, preliminary and detailed design of pipelines, pumping stations, conventional and advanced treatment plants. In all these activities, I have completed computations to size facilities, cost estimating of various facilities, and the development of preliminary schedules. A copy of my resume is attached.

BACKGROUND

On August 19, 2010, the Sacramento Regional County Sanitation District (District) submitted to the Central Valley Regional Water Quality Control Board (Regional Water Board) a report entitled, *Sacramento Regional Wastewater Treatment Plant Infeasibility Analysis and Compliance Schedule Justifications* (Infeasibility Analysis), as prepared by Larry Walker Associates. Included in the Infeasibility Analysis was an attachment entitled, *Initial Compliance Schedules for Various Treatment Scenarios* (Compliance Schedules Memorandum). I supervised, and was responsible for, HDR's preparation of the Compliance Schedules Memorandum. The Compliance Schedules Memorandum provided information with respect to principal planning requirements and the probable length of time to implement five treatment scenarios that would be triggered by various potential effluent limitations and/or permit requirements.

Below, I provide my analysis and conclusions with respect to schedules necessary to complete the design, bidding, and construction phases for treatment that could be required at the Sacramento Regional Wastewater Treatment Plant (SRWTP). I have reviewed the parts of the proposed Waste Discharge Requirements for the Sacramento Regional County Sanitation District, Sacramento Regional Wastewater Treatment Plant, Order No. R5-2010- , NPDES No. CA0077682, that relate to the establishment of potential treatment systems. The potential treatment scenarios are large, complex, and will have to be constructed while keeping the existing plant in operation. This will be extremely difficult and will require careful planning and scheduling.

FINDINGS AND CONCLUSIONS FROM THE COMPLIANCE SCHEDULES MEMORANDUM

Purpose of the Compliance Schedules Memorandum

In response to various potential permitting scenarios proposed by the Regional Water Board, the District prepared compliance schedule justifications in accordance with the State Water Resources Control Board's *Policy for Compliance Schedules in National Pollutant Discharge Elimination System Permits* (Resolution No. 2006-0025), which provides the basis for compliance schedules to be included in NPDES permits for certain new effluent limitations. Resolution No. 2006-0025 requires that the proposed compliance schedules be as short as possible "given the type of facilities being constructed and programs being implemented, and industry experience with the time typically required to construct similar facilities or implement similar programs." (Resolution No. 2006-0025, at p. 5.) The Compliance Schedules Memorandum and the proposed compliance schedules contained therein were prepared to provide the Regional Water Board with the necessary documentation with respect to length of compliance schedules as required by Resolution No. 2006-0025.

Approach

The compliance schedules were based on a variety of factors such as estimating the following:

- The time needed to conduct adequate pilot plant studies for selecting the appropriate technologies for both ammonia removal and membrane applications.
- Estimate number of drawings needed to describe the design, and the labor time needed to prepare the drawings.
- Estimate review time of the design documents by District staff and other entities.
- Estimate of the construction time needed to construct the facilities, and the number of construction contracts that will be needed to complete the project.

The various activity durations were based on my experience and discussions with process and wastewater engineers and construction personnel. These advisors provided general information on processes and construction durations.

Conclusions

The initial compliance schedules for various treatment scenarios contained in the Compliance Schedules Memorandum accurately reflect my analyses and opinions of the time required for realizing compliance.

My opinions include the following:

1. All but two of the treatment scenarios require ten years to design, construct, and place into operation. The treatment scenario for Title 22 Filtration and UV Disinfection and no nutrient removal would require an estimated nine years to construct and place into operation,

while the Thermal Conditioning only scenario could be constructed and placed into operation in approximately five years.

2. All but the Thermal Conditioning scenario will require pilot testing to establish design criteria and identify operational issues that may be experienced.

3. These schedules only provide a generalized understanding of the key activities. Once a technology has been selected, a more detailed schedule would be produced. (A final technology will be selected based on the pilot plant results.)

4. All scenarios will require environmental documentation and follow CEQA guidelines. The length of time to complete this work could affect the schedule.

5. Some, but not all activities for nitrification, denitrification, and Title 22 compliance may be completed in parallel.

6. The schedules in the Compliance Schedules Memorandum have little to no float in the schedule, which means that the schedules can be met only if there are no issues raised that cause a delay.



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Robert B. Williams, P.E.

Senior Vice President

Education

M.S., Sanitary Engineering,
Colorado State University, 1977

B.Sc., Civil Engineering,
University of Cape Town, 1966

40-Hour U.S. Environmental
Protection Agency (EPA) Value
Engineering Training Workshop,
1978

Registration

Civil Engineer, California No.
37558, 1983.

Professional Endeavors

HDR Engineering, Inc.,
1977 to Present

CH2M Hill, 1973 to 1977

Colorado State University,
1972 to 1973

R.V. Anderson Associates,
1970 to 1972

Wyllie and Ufnal Ltd.,
1968 to 1970

Department of Water Affairs,
South Africa, 1966 to 1968

Professional Activities

Water Environment Federation

HDR Tenure

33 Years

Industry Tenure

44 Years

Professional Experience

Mr. Williams has more than 44 years of broad base experience in the study, evaluation, design, and operation of water and wastewater systems. He has authored or co-authored four textbooks and over 20 technical papers. His project background includes a wide range of work assignments such as collection systems, water quality planning, basin planning, cost estimating and the preparation of preliminary schedules. Project experience includes:

Headworks Facility City of Las Vegas, Nevada. Provided technical review of the new headworks facility design as part of the plant expansion to 91 mgd. The new facility includes grit handling facilities, barscreens, new and modified chemical feed facilities for alum and polymer feed, and a loadout area for grit and screenings. Three existing barscreens were relocated and a new barscreen was installed. A new screening conveyer was installed to transport the screenings to a receiving container.

Fresno Headworks Facility - City of Fresno, California. Project principal for the predesign and design of a 225 mgd headworks facility. This \$28 million facility includes 225 mgd influent pumping station, mechanical screens, grit removal, and flow measurement. Participated on a peer review team for the entire project, which included the audit and evaluation of the existing facilities. Flow is measured from each of six influent interceptors using cut throat flumes, and the combined flow is measure in two 10 foot Parshall flumes. Project also included installation of hypochlorite storage and distribution for the entire plant; return activated sludge (RAS) treatment and ferric chloride for odor control

Screw Press Dewatering - Monterey Regional Water Pollution Control Agency, Monterey, California. Assisted the agency with investigating screw press dewatering technology for their 21 mgd wastewater treatment plant. Accompanied agency staff to inspect several screw press installations that have been in place for a long time in Japan, as well as toured the Fuhoku Kogyo Company, Ltd., (FKC) screw press manufacturing facility. Subsequently provided quality assurance/quality control (QA/QC) for design of belt filter press replacement. The dewatering system includes sludge feed tanks and pumps, liquid polymer blending and feed system, three flocculation tanks, three rotary screen thickeners, three screw presses and associated piping, electrical equipment, instrumentation, and two biosolids cake storage tanks. The cake conveyance system conveys dewatered cake from the screw presses directly to rolling bins or trucks for subsequent hauling and disposal.

New Centrifuge Dewatering Facility - Sacramento Regional County Sanitation District, Elk Grove, California. Project manager for the design of a 100 ton/day centrifuge dewatering facility for the Sacramento Regional Wastewater Treatment Plant. Two types of sludges were to be dewatered: anaerobically digested primary and waste activated sludge (WAS); and long-term lagoon stored, anaerobically digested sludge. The project also included complete odor control using hypochlorite in packed tower units.

Mechanical Dewatering Facility Replacement (Contract 21) - City of Las Vegas, Nevada. Provided quality assurance/quality control (QA/QC) and technical input for design of modifications to the existing mechanical dewatering facility. Improvements included additional sludge holding tanks, sludge feed pumps, dewatering building extension, two dewatering centrifuge, polymer feed system, and shaftless screw sludge cake screw conveyance system to transport dewatered sludge cake from dewatering centrifuges to cake tanks. Conveying systems consisted of two angled, three horizontal, and one vertical

conveyor, and odor control. Project also included centrifuge equipment procurement and dewatering building odor control.

Centrifuge Dewatering System at Central Plant - Metropolitan Denver Sewage District No. 1, Denver, Colorado. Designed a centrifuge dewatering system for the 120 mgd Central Wastewater Treatment Plant. The centrifuge thickens or dewater anaerobically digested primary and secondary biosolids, and was considered the largest single unit installed at a municipal plant at that time (800 gpm dewatering capacity). Also designed belt conveyors.

Easterly Wastewater Treatment Plant Tertiary Project - City of Vacaville, California. Project manager for preliminary and final design services for the \$100 million project to upgrade tertiary upgrades the 15 mgd Easterly Wastewater Treatment Plant to meet the requirements of the Regional Water Quality Control Board (RWQCB) permit. Regulatory requirements include compliance with numerical ammonia limits, nitrate limits, elimination of blending, and dry weather filtration/Title 22 reclamation.

Secondary Aeration Intake System Evaluation - City of San Jose, California. Provided quality assurance/quality control (QA/QC) during evaluation of the secondary aeration intake system for the secondary blower building at the San Jose/Santa Clara Water Pollution Control Plant, which included: (1) a site investigation; (2) development of design criteria for an air filtration system; (3) development and evaluation of alternatives for an air filtration system to improve air flow and air quality, reduce fouling of diffuser membranes, and draw filtered air into the secondary aeration blowers; and (4) preparation of planning-level capital cost estimates of the alternatives. Alternatives were evaluated based on capital cost, operation and maintenance costs, logistics of construction, integration with existing facilities, reliability, and operation and maintenance criteria.

Aeration System Upgrade, and Tower Bypass - Delta Diablo Sanitation District, Antioch, California. Project manager for predesign, design, bidding, and construction of aeration system upgrades, and tower bypass improvements at the 16.5 wastewater treatment plant. Aeration basin improvements comprise of replacement of the mechanical aerators in the aeration basins with a more energy-efficient and cost-effective fine-bubble aeration system. The diffused air system includes new aeration blowers, air piping, aeration diffusers, and ancillary electrical and instrumentation systems. The tower trickling filter bypass improvements involve retrofit of the existing flow equalization basin pumping system and piping to allow a portion of primary effluent around the trickling filters directly to the aeration basins.

Army Base Treatment Plant - Hampton Roads Sanitation District, Norfolk, Virginia. Provided quality assurance/quality control (QA/QC) during design of improvements to upgrade the 18 mgd Army Base Treatment Plant. Upgraded included enhanced nutrient removal and ancillary plant improvements.

Las Vegas Water Pollution Control Facility Expansion to 48 mgd - City of Las Vegas, Nevada. Designed various parts to expand the plant to 48 mgd, and provided quality control review of a 28 mgd expansion of the plant. Projects included odor control through ferrous chloride addition, slow speed turbine mixing for a digester, and upgraded anaerobic digester heating through a hot-water loop system.

Wastewater Treatment Plant Expansion - City of Yuba City, California. Project manager during predesign, design, bidding, and construction engineering services to expand the wastewater treatment plant from 7 to 9 mgd. Improvements included new headworks facility, pure oxygen activated sludge system modifications, concrete renovation of the oxygen and chlorine contact basins, plant effluent discharge piping modifications, additional reclaimed water pumping system, new cogeneration system utilizing microturbines, anaerobic digestion system upgrades, additional belt press for dewatering, sludge drying bed modifications to simplify drying and removal and improve dust control, soil bed odor control for the headworks and solids handling facility using biofilters, new 5,000-square-foot administration building, conversion of the existing administration

building to a laboratory, new maintenance building, new maintenance storage building, miscellaneous site work (including paving), miscellaneous hydraulic improvements, plant-wide electrical system improvements, and plant wide landscaping.

Atlantic Wastewater Treatment Plant Expansion - Hampton Roads Sanitation District, Virginia Beach, Virginia. Provided quality assurance/quality control for design of improvements to expand the 36 mgd Atlantic Wastewater Treatment Plant to 54 mgd, with provisions for a future expansion to 72 mgd. Improvements included expansion of headworks with fine screening and vortex grit removal tanks, 12.3 million-gallon (MG) two-pass biological treatment aeration basin, relocation of the centrifuges adjacent to the cake storage pad to eliminate cake hauling operation (saving more than \$250,000 in annual O&M costs), new centrifuge dewatering building, four new gravity belt thickeners for waste activated sludge (WAS) thickening, converting the biosolids holding tanks to acid-phase digester to increase volatile solids reduction by 10 percent (saving more than \$200,000 annually in land application and dewatering chemical costs), conversion of six existing primary and secondary digesters to gas-phase digesters, blower facility, addition of two primary clarifiers, addition of two 160-foot-diameter secondary clarifiers and rehabilitation of four existing secondary clarifiers, two chlorine contact tanks, addition of

Influent Hydraulic/Lower Northwest Interceptor (LNWI) Relief Project at the Sacramento Regional Wastewater Treatment Plant - Sacramento Regional County Sanitation District, Elk Grove, California. Principal-in-Charge for hydraulic analysis of the Sacramento Regional Wastewater Treatment Plant influent system under discontinued and restricted influent pumping conditions, as well as development and evaluation of feasible alternatives that optimize overflow relief at the plant during high-flow conditions or treatment plant outages as well as prevent surcharges and spills in the gravity interceptors. Financial and non-financial costs and benefits were analyzed under a business case evaluation to identify the alternative with the most appropriate benefit/cost ratio in terms of value to sewer customers.

Sacramento Regional Wastewater Treatment Plant Hydraulic Model - Sacramento Regional County Sanitation District, Elk Grove, California. Principal-in-Charge for development of a hydraulic model for the 165 mgd Sacramento Regional Wastewater Treatment Plant.

Phase 2 Ammonia Study, Treatment Cost Evaluation - Sacramento Regional County Sanitation District, Elk Grove, California. Principal-in-Charge and provided quality assurance/quality control (QA/QC) for a study that evaluated the performance and cost of the ammonia reduction treatment technologies for the Sacramento Regional Wastewater Treatment Plant,

Publications

Textbooks and Reports

Handbook of Public Water Systems, second edition (contributing author), John Wiley & Sons, Inc., New York, NY, 2001. South Water Development and Plant Hydraulics chapters.

Handbook of Public Water Systems, (coeditor and contributing author) Van Nostrand Reinhold, New York, New York, 1986.

Energy in Wastewater Treatment, (contributing author) Prentice-Hall, Englewood Cliffs, New Jersey, 1982.

Water Reuse, (contributing author) Ann Arbor Science, Ann Arbor, Michigan, 1982.

Wastewater Reuse and Recycling Technology, (coauthor) Noyes Data Corporation, Park Ridge, New Jersey, 1980.

Management of Small-to-Medium Sized Municipal Wastewater Treatment Plants,
(coauthor) EPA Report 430/9-79-013, June, 1979.

Inspectors Guide for Evaluation of Municipal Wastewater Treatment Plants, (coauthor)
EPA report 430/9-79-010, April, 1979.

Papers/Conferences

Williams, R., Olson, C., Kennedy, K., and LaBarbara, D. "Evaluation of Secondary Clarifier Improvements at the Minden-Gardnerville Sanitation District," presented at the CWEA Annual Conference, Oakland, California, April 1998.

Williams, R., Kyotani, V., Ito, S., "Centrifuge Dewatering at the Sacramento Regional County Sanitation District's Wastewater Treatment Plant." Presented at the California Water Environment Association Conference, April 1996.

Williams, R.B. and Neethling, J.B., "Using Operating Data for Decision Making in Treatment Plant Design and Operation," Presented at the 67th Annual California Water Environment Association Conference, Palm Springs, CA, April 19-21, 1995.